

# Sandia Offers Temporary Use Of RHIC-II Lab to SEMATECH

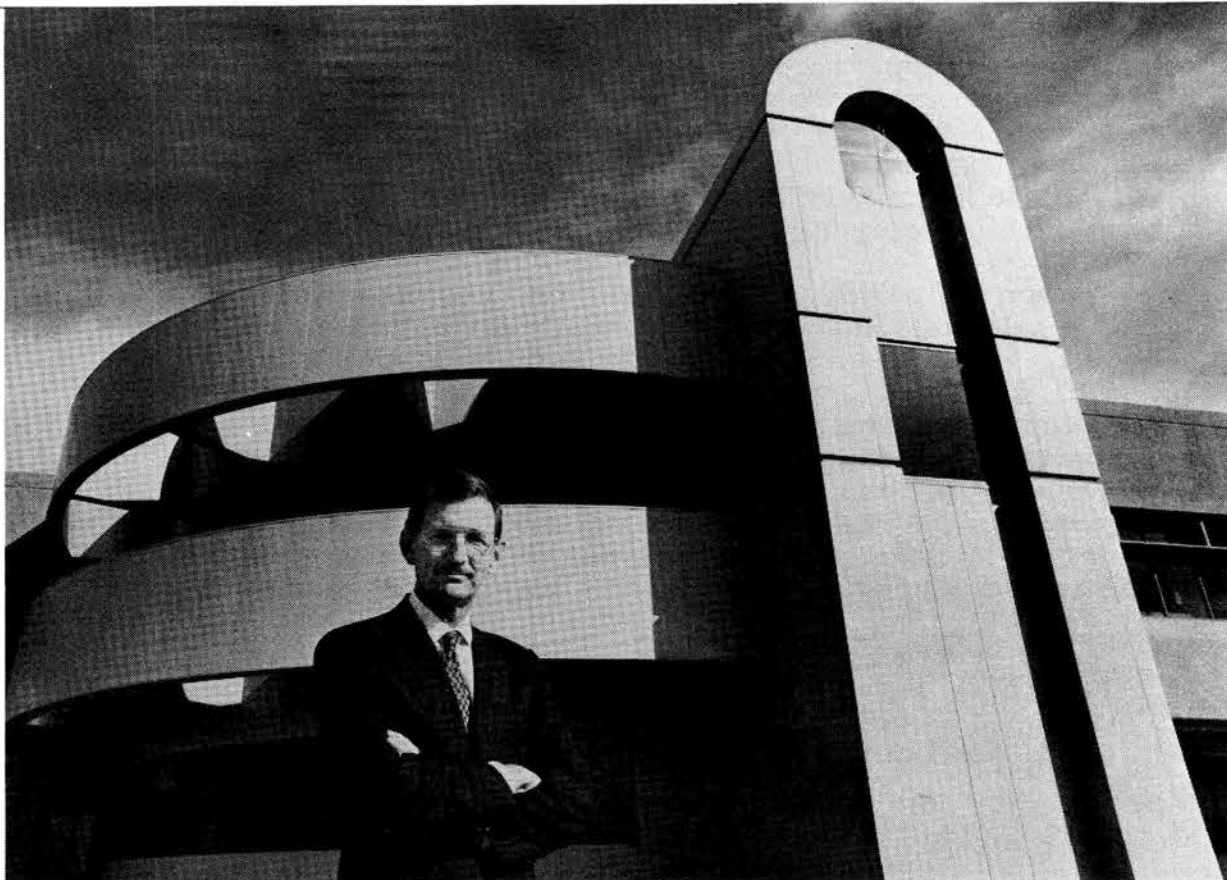
Recent news reports covered the Sandia-DOE proposal that RHIC-II be used temporarily by SEMATECH, a consortium of U.S. semiconductor firms (see "SEMATECH: Partnership with Purpose" story). But there's more to the story — it has implications for federal, state, and city governments; the industry; and the Labs.

The basics of the proposal are simple enough. The RHIC-II (radiation-hardened integrated circuit) lab, as well as Sandia semiconductor fabrication technology and analytical support, would be used by SEMATECH for a three-year period on a cost-reimbursable basis. CRM (Center for Radiation-Hardened Microelectronics) would continue to support current commitments using its facilities in RHIC-I (Bldg. 870).

The proposal has the support of DOE, which is in turn supporting a strong Administration position in regard to cooperation between government-funded R&D labs and the nation's semiconductor industry. A portion of a letter from Ray Romatowski, Manager of DOE/AL, to SEMATECH can be paraphrased as follows:

**Congress is proposing to authorize a program in the FY88 Defense Authorization Bill to stimulate the development of semiconductor manufacturing technology through a consortium of firms in the domestic semiconductor industry. Strongly supporting this initiative, and very much in the same direction, is the President's Executive Order of Aug. 10, 1987. The President called on the Secretary of Energy and others to select one or more national labs to participate with a consortium composed of U.S. industry and universities in R&D of potential importance to long-term economic competitiveness. The R&D should be in an area in which the lab has special competence; both lab facilities and personnel should be made available to the consortium. DOE Secretary John Herrington has stated that the DOE's multiprogram labs, such as Sandia, are in an excellent position to implement the President's competitiveness initiative.**

Since then, SEMATECH has been identified as the consortium of semiconductor industry firms with which the national labs should participate.



SANDIA AND DOE have offered the use of this new state-of-the-art facility, the RHIC-II (radiation-hardened integrated circuit) lab, to SEMATECH, a consortium of semiconductor manufacturers. "If the proposal is accepted, SEMATECH would have an ideal start-up site for three years, and Sandia would gain additional work in a new mission of national security importance," says Bob Gregory, Director of Microelectronics 2100.

The FY88 Defense Authorization Bill is expected to pass shortly, and it contains a section urging the kind of cooperation specified in Ray's letter.

## Why Are the Feds Involved?

The nation's modern defense systems — radars, guidance systems, some safety systems, delivery systems (planes and missiles), communications, and many more — rely heavily on microelectronic devices. Although nearly all of the devices were invent-

ed by U.S. firms, those firms have not perfected the manufacturing processes needed for efficient device production. Thus, they've been unable to compete with foreign manufacturers for either foreign or U.S. markets.

In other words, the firms are losing out in a global struggle, which means lower profits, fewer people working, fewer devices produced — and therefore less revenue for the critical manufacturing R&D, "a Catch-22 situation," says Larry Anderson (2000).

*(Continued on Page Six)*



# LAB NEWS

VOL. 39, NO. 22 SANDIA NATIONAL LABORATORIES NOVEMBER 6, 1987

## Two Sandia Winners

# Embedded Atom Method, Laser-Initiated Chemical Etching Earn DOE's Materials Sciences Research Awards for 1987

Two Sandia projects were winners in DOE's Materials Sciences Research Competition for 1987. In the metallurgy and ceramics category, the "sustained outstanding research" award was won by Mike Baskes, Murray Daw, and Steven Foiles (all 8341) for their work on the embedded atom method.

In the materials chemistry category, the "significant implications for energy-related technology" award went to Ken Greenberg and Wayne Johnson (both 1126) for work entitled "Laser-Initiated Chemical Etching and Deposition for Applications to Microelectronic Circuit Processing."

DOE sponsors the annual competition to identify DOE lab scientists across the nation who have conducted outstanding research. Judges are also DOE lab scientists, so winning an award means impressing one's peers in other labs.

"Your award consists primarily of collective recognition by the DOE community of your outstanding research contributions," says Iran Thomas, Director of the Division of Materials Sciences in DOE's Office of Basic Energy Sciences. "All of the nominations for these awards were significant; you can be truly proud of being first in your category."

"I'm very pleased with the work being done at Sandia, and the rest of the laboratory community recognizes the Sandians' efforts," Thomas continues. "The competition was tough, but there was surprising agreement among the judges as to the winners. They really stand out — all the entrants would get A's in the academic world. We tell judges to reject those that walk on water and certainly those who get their feet wet. 'Look for the ones who tiptoe,' we tell them.

"Needless to say, we expect wondrous things from Sandia in the future," Thomas concludes.

## Long-Term SNLL Project

The Livermore Sandians' work centers on devising a theoretical model that describes how metals and metal alloys respond to invasion by hydrogen or other corrosive impurities. Developed first in 1983, their model overcame the long-standing inability of researchers to predict how cracks initiate and grow in these materials.

The work is part of a group effort to devise a realistic model, using a computerized shortcut, to identify the fundamental properties of metals and

*(Continued on Page Four)*

# Antojitos

Life Under the Hold Button Scores of Sandians in the micro-electronics organizations (2100 and 2800) have packed their bags but have nowhere to go, thanks to last week's offer of the use of the new RHIC-II lab to SEMATECH for three years.

A couple of hundred people were scheduled to move into RHIC-II, but most of them are on hold pending SEMATECH's acceptance or rejection of the offer. Many other moves are affected too -- part of the Sandia tradition known as domino migration, in which "When you vacate that space, we'll fill it, and they'll take our old space," etc., etc. down the line. (Those unknown folks charged with deciphering spy satellite pix of Sandia must often be tempted to say that Sandia's primary mission is to move people and their possessions from one building to another.)

Whether the moving delay is three weeks or three years, 2100's and 2900's primary task -- hardening microelectronic devices against the effects of ionizing radiation -- will continue apace. The task is far too vital to the nation's defense systems to interrupt.

So when are we going to know? SEMATECH won't decide until after the potential-site visits are completed -- New Year's Eve maybe.

And let's all remember that the decision will be based not only on appropriateness of the site -- and RHIC-II is arguably the world's leading integrated circuit facility design -- but also on political realities. Enough said.

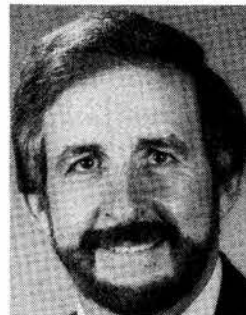
\* \* \*

Beware -- As AT&T goes, so goes Sandia. Barry Schwartz (6313) is worried about a recent Weekly Bulletin item announcing an "AT&T Employee Sales Plan." Says Barry, "I've heard of transfers, early retirement, and layoffs, but this is going too far!" ●BH

\* \* \*

La patience est amère, mais son fruit est doux. --Rousseau  
(French: Patience is bitter, but its fruit is sweet.)

## Livermore Supervisory Appointments



MARLIN POUND to manager of Administrative Services Department 8530, effective Nov. 1.

Marlin joined Sandia at Livermore in 1957 after two years in the U.S. Marines. His first assignment was in the Personnel Division where he established the technical institute recruiting program and later became responsible for the college recruiting program.

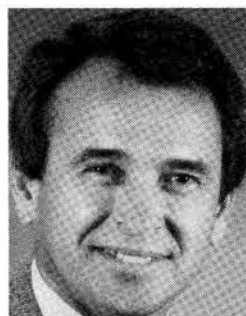
In 1963 he was named supervisor of the Employment and Personnel Development Section. In 1966 he was promoted to supervisor of the Training, Benefits and Medical Division. He next headed a reorganized division that added library and mail distribution sections, with benefits and medical functions going to a new division. For the past two years, he has been supervisor of Physical Security Division 8531.

His education includes a BS in business administration from UNM in Albuquerque. He is a native of Chama, N.M.

Marlin was elected to the Livermore Area Recreation & Park District board of directors in 1968 and has been reelected every four years since. He has served four terms as chairman and is currently vice-chairman. He is also a founder and member of the board of the California Recreation & Park Districts Liability Insurance Program and before that a founding member of the California Park & Recreation Districts Workers Compensation Self-Insurance Pool.

Related activities include membership in the National Park & Recreation Association Commissioners and founding member of the California Association of Recreation & Park Board Members & Commissioners. He has served on the boards of both in the past. Marlin's community activities also include the Livermore Rotary Club and former membership on the board of the Student Education Loan Fund.

Marlin's recreational interests are tennis and bowling. He is the father of four grown children, three daughters and one son, and has lived in Livermore for the past 30 years.



LEN HILES to manager of Systems Development III Department 8130, effective Nov. 1.

Len joined Sandia Livermore in February 1966. He first worked in the Underground Instrumentation Division on thermal sensor development, thin film magnetics, and high-power lasers for effects tests. Next he designed control systems for maneuvering reentry vehicles; he also worked on the GLADD (glide bomb) project and B77 development.

Another assignment was with the Solar Central Receiver Division where he worked on advanced central receiver projects. At the end of 1978 he was promoted to supervisor of the Instrumentation Development Division. He worked in special projects from 1980-84, then spent 18 months in Theater System Studies. His most recent supervisory post was the Electronic Subsystem Division.

Len's education includes a BS from Cal State University at Fresno and an MS from UC Berkeley, both in electrical engineering. He has taken additional postgraduate course work at UC Davis. He is a member of IEEE.

The father of two grown sons, Len has lived in Pleasanton the past three years, after nearly 20 years as a Livermore resident. His outside interests include running, biking, swimming, diving, and downhill skiing. He is also building a summer home at Sea Ranch on the Northern California coast.

### ECP '87 Update

## Sandians Break Record (Again)

Preliminary results of the '87 ECP Campaign are in. Pledges as of Nov. 2 total \$1,208,615 an increase of 3.9 percent over last year's total of \$1,163,576. Annual pledges are up by an average of \$8 over last year.

Final results will be published in the next issue of the LAB NEWS, along with campaign highlights.

### Sympathy

To Todd Felver (8343), on the death of his father in Tracy, Sept. 7.

To Graham Thomas (8444) on the death of his mother in Baltimore, Md., Aug. 31.

### Congratulations

To Christine Yang (8231) and Howard Hirano (8446), a daughter, Kathleen Aiko, Sept. 14.

To Susan and Steve Bunn (8272), a son, Jonathan Miles, Sept. 28.

## Welcome to Livermore

### Alabama

Zolita Bobo (8143)

### Arizona

Victor Kaliakin (8241)

### Connecticut

Ellen Meeks (8245)

### Idaho

Bill Shreeve (8143)

### Illinois

Ray Cline (8233)

### New Jersey

Edward Klaus (8342)

### New York

Joel Kuhlmann (8131)

### Ohio

Mark Horstemeyer (8154)

### Texas

Juan Meza (8233)

### California

Jerrold Friesen (8235), Livermore  
Susan Crawford (8444), Santa Clara  
Carlotta Fugazzi (8522), Pleasanton

## LAB NEWS

Published Fortnightly on Fridays

### SANDIA NATIONAL LABORATORIES

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LIVERMORE RETIREES GATHERED in the Castlewood Country Club lounge before dinner.

## Livermore Retirees Reunite at Castlewood

Some 350 Sandia retirees and spouses gathered at Castlewood Country Club Oct. 14 for the 22nd annual retirees dinner.

Coming the farthest was Louis Rosnoski of Rapid City, S. D. Other travelers were Oregon residents Don Richardson, Ralph Jaeger, and Walt Dzugan;

Washington states Joyce Willford and Gunner Scholer; Arizonan Harold Faulkner, and New Mexican Fern Moffat.

Special guests were Livermore VP John Crawford and President Irwin Welber. The 1988 dinner has been set for Oct. 12.



PRISCILLA PAYNE (left), Shirley and Don Baumann.



DEE ALLEN (left), Len Allen, and Price Hennan.



BEFORE DINNER, Evelyne Bachman stopped to chat with (from left) Vange Jones and Ben and Marge Aikin.



THREE VEEPS, past and present: John Crawford (Livermore VP since June 1, 1987), Burnie Biggs (1961-68), and Dick Claassen (1982-87). Tom Cook (1968-82) arrived at the get-together too late for this photo. (All photos by Bud Pelletier, 8186)

(Continued from Page One)

## Awards

alloys, and the effects of hydrogen on these materials. The embedded atom method allows calculations to be done on an atomistic scale (that is, individual atoms are considered). The advantage over earlier models is that it reveals details not evident in macroscopic studies. (For more detail, see LAB NEWS, May 11, 1984, or Sept. 12, 1986, or *Sandia Technology*, Dec. 1985.)

"We have used the embedded atom method to study nickel aluminides and several face-centered cubic materials — nickel, copper, palladium, silver, platinum, and gold, for example," says Mike. "It has provided some useful insights into the alloying process and the strength of grain boundaries.

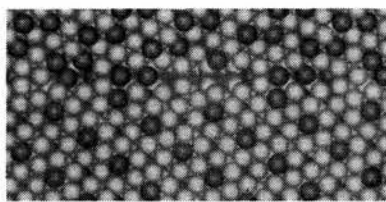
"We plan similar studies on body-centered cubic materials, such as iron, and on semiconducting materials, such as silicon," Mike continues. "Winning the award is exciting because it reassures us that we're going in the right direction."

"I'm particularly pleased that this award recognizes truly original work by our staff," says Peter Mattern, Director of Combustion and Applied Research 8300. "And I'm delighted that the embedded atom method is now being adopted worldwide. It's turning out to be a most useful computation technique."

### New Tool for Microelectronic Circuit Repair and Modification

Laser beams are commonly used by the semiconductor industry to remove materials from microelectronic circuits. But it's basically a mechanical process: The materials are removed ablatively — blasted away, in other words — by a high-powered laser beam. The process leaves debris, can damage underlying and adjacent parts, and is hard to control with the fine precision necessary to remove only one tiny bit of material.

The new process developed over the last couple of years by Ken and Wayne avoids these problems by using a much lower-powered laser beam. They etch (erase) aluminum interconnects in an IC (integrated circuit) by placing the IC in a vacuum chamber filled with chlorine gas. A pulsed laser beam is then directed onto the aluminum. The beam creates microscopic cracks in the thin (20 Angstrom) aluminum oxide coating that is naturally present on the aluminum. The crack allows the chlorine to contact, and spontaneously react with, the aluminum



DISCUSSING THEIR "EMBEDDED ATOM METHOD" are (from left) Steve Foiles, Murray Daw, and Mike Baskes (all 8341). The method recently earned a Materials Science Research award for sustained outstanding research. Computer simulation (inset) shows nickel-aluminide grain boundaries.

beneath the coating, thus etching it away.

Another process that uses lasers and chemistry can create a new connection between conductors. In this case, the gas can be, for example, silane (if the connector is silicon) or tungsten hexafluoride (if the connector is tungsten). The laser controls the deposition of the material; that is, it "writes" conducting lines into the circuit.

These two processes can be used to rewire the metal level of microelectronic circuits. The gases used are highly compatible with the ICs — they are used in processing almost all silicon-based ICs today. The gases can be handled in one system. The circuit to be modified can remain in a vacuum chamber until the "erasing" and "writing" (etching and depositing) have been completed.

The award citation mentions "significant implications" for energy-related technology. Those implications are apparent in the developers' discussion of the technique: "We can use the technique to alter and repair microelectronic circuits without the time-consuming difficulty involved in creating a new [photolithographic] mask," says Wayne. "We've demonstrated our ability by altering the metal connection and verifying an improved design in a circuit fabricated in RHIC-I."

Another application of the technology will be

### Vook Keeps Score

Sandia has won eight of 26 awards in the Materials Sciences Research Competition in the last three years, reports Fred Vook, Director of Solid State Sciences 1100. "LBL [Lawrence Berkeley Lab] has won five, Argonne three, Ames three, Oak Ridge two, Brookhaven two, Stanford Synchrotron Radiation Lab one, and the University of Illinois one.

"We are extremely pleased with the continued successes the Labs is enjoying in this competition and in being formally recognized for the quality of our materials science research," Fred continues.

"The Albuquerque award is particularly significant because it is related to technology important to semiconductor processing and to Sandia's interaction with SEMATECH. It also directly applies to our own microelectronic initiatives in design fault analysis that are under way in 2100."

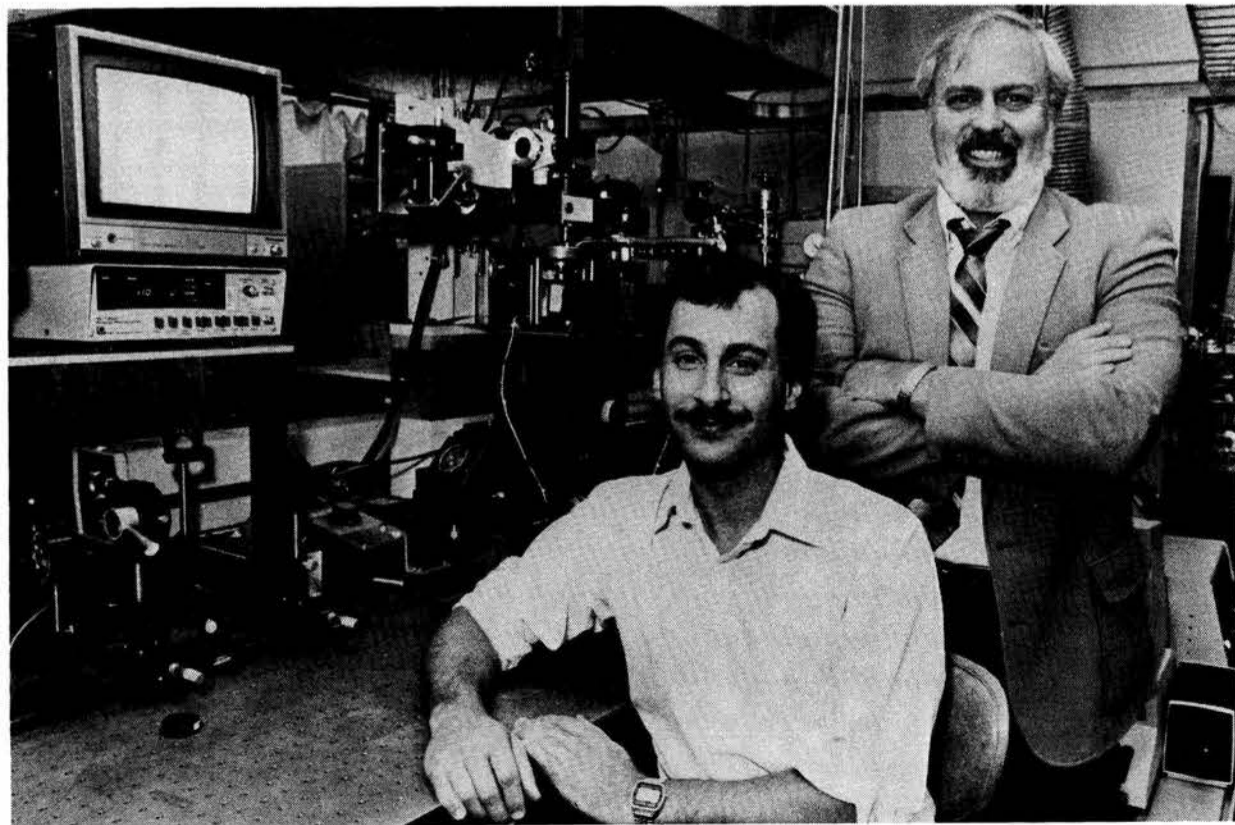
Other winners this year included LBL, Ames, Argonne, and Stanford.

in redundant memory circuits, which are used by virtually all U.S. semiconductor manufacturers today. The aluminum etching process developed by Ken and Wayne can simplify and improve the procedures used to activate the redundant parts of the circuits. "Our new technique should be quite attractive to the semiconductor industry as it moves toward 1-micron feature sizes," adds Ken. "With feature sizes that small, the currently used laser-induced ablation technique is difficult to control precisely enough to do the job. The lower laser power we use allows much greater tolerance limits."

### Lots of Potential

The process can also be used in new fabrication techniques. "The ability to both etch and form interconnects on ICs can be applied in a variety of new processes," says Wayne. "We've demonstrated that ability in design modification and verification, and we know it will work on redundant memory circuits. It should apply equally well to redundant logic circuits, customized gate arrays, and other devices. There's lots of potential here."

The two plan to continue studying the fundamentals of the surface interactions that make the new technique work. "We've done the applied research," says Wayne. "Now we'll do some basic research so we can answer the questions sure to arise once the technique is used to attack a variety of fabrication problems. We'll also look at how the technique might have applications to other metals."



IN THE LAB where they developed a new process for repairing and modifying microelectronic circuits, Ken Greenberg (left) and Wayne Johnson (both 1126) demonstrate their pride in winning a Materials Science Research award and their equipment—a combination laser-microscope system. The TV screen displays the image seen by the microscope, which is used with the laser to deposit and erase minute interconnections on circuits.

## Take a Breather!

By Arlene Price (3330)

Ever feel like quitting? Nov. 19 is the day for quitters!

It's the Great American Smokeout (GAS). It's sponsored by the American Cancer Society, which is celebrating its 11th year of helping people quit smoking.

And that's when Sandia joins the festivities and invites you to participate in a day for smokers not to smoke. It's a day to encourage smokers to take one small step that could be the most important step they've ever taken in their lives.

It's a great boost when smokers can prove to themselves that they can survive 24 hours of abstinence. So the goal of the 1987 GAS is to get at least one in every five smokers to give up cigarettes from midnight to midnight on Thursday, Nov. 19. (Anyone getting a late start on Thursday can extend the 24-hour period as long as necessary past the midnight deadline to get in a full day.)

Larry Hagman is again the national chairman. Locally, Channel 7's Jim Hussin will feature a week-long special of televised features on smoking cessation in honor of the occasion.

I've worked with Medical and TLC to plan activities to help Sandia's smokers get through the smoke-free day successfully. If you're among the first 100 smokers to take the pledge to quit smoking, you'll be able to get a survival kit — munchies to help you through those rough moments — at three GAS stations in the Labs: one in Bldg. 801 (next to the snack bar), one in the lobby of Bldg. 822, and one in the Cafeteria; GAS stations are open from 8 a.m. to 1 p.m.

The stations will also provide quit-smoking tips, Adopt-a-Smoker contracts, stickers and buttons, and other materials. The Cafeteria will again feature a cold turkey special in honor of the occasion.

A new feature this year is a quit-smoking booster session in Bldg. 815 from noon to 12:45. If you find yourself wavering, we want to help boost your motivation. If you've tried to quit before, we want to help get you remotivated. Both smokers who need the inspiration and non-smokers who are willing to share their strategies are invited to attend. Spouses and friends are also welcome. Bring your lunch.

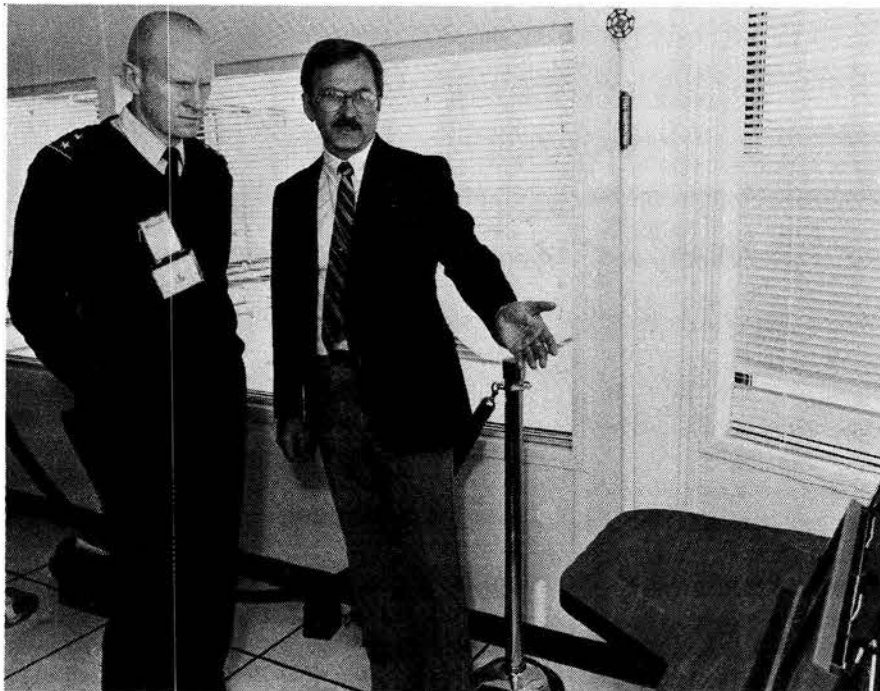
### Congratulations

To Gail and Paul (1143) Gourley, a son, Brett Andrew, Oct. 7.

To Sharla Bertram (6334) and Jim Howery, married in Albuquerque, Oct. 10.

To Pam (5255) and Ralph Harris, a daughter, Katherine Deneb, Oct. 20.

MAJOR GENERAL SCOTT SMITH (left), DoD's Deputy Assistant to the Secretary (Atomic Energy) for Military Application, recently visited Sandia's Technical On-Site Inspection Facility. Here John Holovka (9111) demonstrates a data display console used with a portal/perimeter monitoring system that may eventually be used for arms control verification purposes.



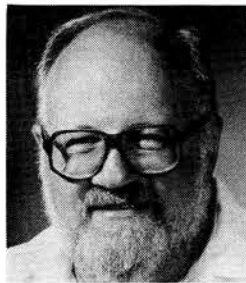
## Non-Smokers: Help a Friend

The GAS (Great American Smokeout) on Nov. 19 is a once-a-year opportunity for non-smokers to adopt a smoker for a day. Your task is to help your friend get through 24 hours without a cigarette. The GAS stations in Bldgs. 801, 822 and the Cafeteria will have Adopt-a-Smoker contracts and other aids for the two of you.

Here are some other ideas to help you survive your smoker friend who is surviving without smoking that day:

- Don't nag or threaten!
- Make yourself available either in person or by phone for the entire day.
- Take your adoptee out for breakfast or lunch. Or promise a special dinner at his or her favorite restaurant.
- Go public with your adoption. Enlist the aid of others in giving moral support to your adoptee.
- Give up something for the day (candy, desserts, coffee, etc.), especially if you're a never-smoker.
- If you're an ex-smoker, share your experiences; what worked for you may work for others. But don't lecture.
- Offer a lift to work and back home again.
- Schedule an evening activity that minimizes the temptation to smoke — take in a movie, try a strenuous activity (racquetball, a swim, etc.), or get together with fellow adopters and adoptees.
- Be a cheerleader — offer praise, encouragement, and, at the end of the day, congratulations.
- If/When your friend makes it for a day, urge him/her to stay off cigarettes permanently.

## Death



Peter Thoma of Engineering Procedures, Specifications, and Support Division 2833 died suddenly Oct. 19.

He was 55 years old.

He had been at Sandia since September 1959. He is survived by his wife and four children.

## Welcome

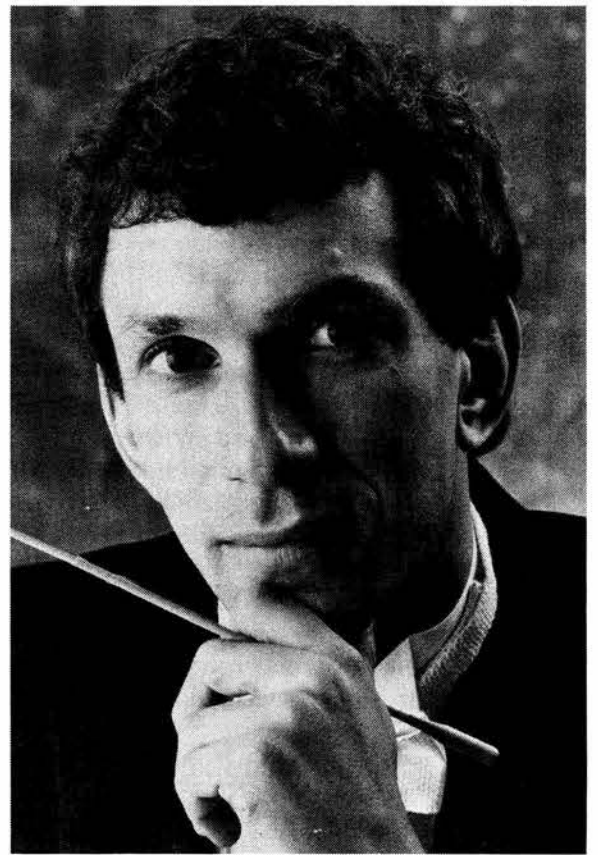
### Albuquerque

Nadine Bandat (5268)

John Gutierrez (3426)

### New Mexico

Felix Perez (3426)



NEAL STULBERG

## What Does a Conductor Do?



Few of us come away from an orchestra concert without admiring the conductor — the only performer who makes no sound. And during a concert, we give the conductor the attention we would give a featured soloist.

Yet for most of us, exactly what a conductor does is something of a mystery. How *does* he get all those musicians to produce the tempo, the phrasing, and the dynamics of the music?

These are some of the mysteries Neal Stulberg, conductor of the New Mexico Symphony Orchestra, will attempt to unravel at the next Community Focus program on Tuesday, Nov. 10, at 12 noon in the Technology Transfer center. He'll use a piano to demonstrate some of the deeper mysteries of the conductor's art. He'll also describe the complex and fascinating relationship between conductor and orchestra.

### An Accomplished Pianist

An accomplished pianist as well as conductor, Stulberg is in his third season as music director of the Orchestra — currently rated as a regional orchestra, making it one of the most prestigious in the Southwest. He made his Classical Concert Series debut as a pianist in Mozart's Concerto for Three Pianos in September.

Before coming to New Mexico, Stulberg spent three years with the Los Angeles Philharmonic as Exxon/Arts Endowment Assistant Conductor, and conductor of the Young Musicians Foundation Debut Orchestra of Los Angeles. He has served as guest conductor with orchestras throughout the country, including the National Symphony, Indianapolis Symphony, the Oregon Symphony, the Evansville (Indiana) Symphony, and the Los Angeles Philharmonic at the Hollywood Bowl.

After graduating from Harvard with a degree in social studies, he attended the Accademia Nazionale de Santa Cecilia in Rome and later earned a master's degree in orchestra conducting from the University of Michigan. He pursued post graduate studies at the Juilliard School and later served as pianist and opera coach on the staff there.

In addition to his artistic duties, Stulberg holds an adjunct professorship at UNM and teaches a course in the general honors program there.

(Continued from Page One)

## SEMATECH

Congress is now facing the implications of a future in which defense systems will need sophisticated microelectronics that may be unavailable in the U.S. — hence the formal push noted in Ray's letter.

It is, then, considered to be in the nation's best interest that the national labs such as Sandia be coupled with the semiconductor industry. As President Welber put it:

**Sandia National Laboratories has a vital role in the national security of the US. Our programs and systems depend greatly on integrated circuit microelectronics. In turn, our capabilities rely on a strong US semiconductor industry to provide the technology base for our work in integrated circuits and for customized circuits for our systems. We greatly value close cooperation with industry to provide this technology.**

### The State, the City, and the University

The formal proposal package that went to SEMATECH last week included strong pledges of support by Governor Garrey Carruthers, James Covell of Albuquerque Economic Development, and UNM President Gerald May. All of them pointed out the advantages to SEMATECH of accepting the Sandia-DOE offer and, of course, of choosing Albuquerque as the site for SEMATECH's permanent facility once the three-year use of RHIC-II ends.

Gov. Carruthers noted "the innumerable technical-quality-of-life attributes available here in New Mexico: two major national laboratories; several other federal laboratories; major semiconductor and computer manufacturers; access to enormous computing facilities, including a Cray 2; an infrastructure of contract research organizations . . . and educational facilities."

President May mentioned UNM's "rapidly developing research and education programs in several key departments." He emphasized UNM's Center for High-Technology Materials and a new program in manufacturing engineering. He also noted the possibility that SEMATECH staff could serve as adjunct or joint professors at the University.

And both May and Covell suggested that SEMATECH consider UNM's Research Park in the South Campus as a permanent facility site.

### Industry: Yield Is Everything

As noted in the "SEMATECH: Partners with Purpose" story, SEMATECH is *not* a semiconductor research organization. That is, it will not develop new semiconductors; it will develop new tools and techniques to produce semiconductors more efficiently.

But that's an important step forward. Basically, it means increasing the yield, the ratio of good chips (or semiconductors or ICs — integrated circuits) to bad chips in a manufacturing lot. As William Neikirk put it (in a *Chicago Tribune* story on SEMATECH):

**In the American semiconductor**

## SEMATECH: Partnership with Purpose

SEMATECH (SEMiconductor MANufacturing TECHNOlogy) is a consortium of U.S. semiconductor manufacturers and suppliers of semiconductor manufacturing equipment and materials. Its objective is to develop and test advanced semiconductor manufacturing processes, materials, and equipment on an actual production line, and to transfer that technology to its member companies for commercial application.

Its primary goal is to enable the U.S. to regain its competitive posture in a strategic technology.

SEMATECH's members come from 13 semiconductor firms representing two major groups (the Semiconductor Industry Assn. and Semiconductor Equipment Materials Institute). SEMATECH, founded in May 1987, works closely with the U.S. government and the national labs.

Many SEMATECH members are acquainted with Sandia and with RHIC-II. In September, 120 participants in two SEMATECH workshops toured the lab and were briefed on its unique capabilities and equipment.

## So What Are the Chances?

SEMATECH may or may not accept the Sandia-DOE proposal to use the RHIC-II lab for the next three years. As is suggested by the competition to be chosen the site of DOE's Superconducting Super-Collider (and, in our region, the research center for US West), competition for high-tech enterprises is keen — many states and cities would like very much to be home to SEMATECH's permanent facility.

It's also true, of course, that SEMATECH could accept the Sandia-DOE offer but still choose to build its permanent facility somewhere other than Albuquerque (although state and city sup-

port are naturally predicated on a SEMATECH commitment to remain here after the three-year period).

So what are the chances of SEMATECH's accepting the proposal? "There are several other semiconductor manufacturing, if not R&D, facilities lying vacant around the country," says Bob Gregory (2100). "Every state and local government involved is eager to get a commitment from SEMATECH."

"But with Sandia's superb facility and excellent technical reputation, I'd say our chances are 50-50."

**business, yield is everything. Yield equals money.**

**It is the one thing giving the Japanese an edge in semiconductor manufacturing and threatening the livelihood of the chip industry in the United States. The Japanese have a five percent better yield than American plants, said a Brookings Institution technology expert, Kenneth Flamm.**

**If the ability to make chips profitably leaves American shores, the industry fears, the United States easily could fall behind in one of the world's important technologies. With manufacturing might go the design and development of the chips. All are crucial to American technological superiority . . .**

. . . and, of course, national defense.

Industry is serious about SEMATECH; it has earmarked \$100 million for the effort in 1988. And, given the national security implications of a weak semiconductor industry, the U.S. government is also serious about — and much involved in — SEMATECH's objective. That involvement is expected to be formalized in the Defense Appropriations Bill now before Congress. Current plans call for Congress to match the industry's \$100 million grant.

Dedicated partners, a clear-cut goal, reasonable funding — what else could SEMATECH need? "The most critical remaining factor in SEMATECH's success is the early availability of a world-class fabrication facility to enable a fast start," said Bob Gregory, Director of Microelectronics 2100, in an Oct. 26 letter to Larry Anderson (2000). "The RHIC-II facility at Sandia is exactly what SEMATECH needs to assure early program success. RHIC-II represents the state of the art in ultraclean rooms. RHIC-II has an equipment set that closely matches the start-up technology planned for SEMATECH. RHIC-II is currently unoccupied but is ready for occupancy. SEMATECH could immediately move into RHIC-II and make rapid progress in meeting its objectives."

### Rationale Behind the Offer

No one yet knows whether SEMATECH will accept the proposal. But Sandia and DOE managements have worked hard to ensure that both SEMATECH and Sandia would benefit if the offer is accepted.

"How would SEMATECH use of RHIC-II af-

fect our ability to meet our program commitments?" is the question asked in Bob's letter to Larry. Here's the answer:

**We have explored this question carefully, looking for possible impacts on our current and future programs. Our assessment is that the impact on present programs will be minimal, perhaps even positive, and that the impact on future programs will be positive.**

The reasoning leading to these conclusions is as follows: Our current and near-term programs (B61, B83, Trident II, VCT [treaty verification satellites], SICBM [small intercontinental ballistic missile], CAP [code-activated processor], SRAM [short-range attack missile] employ, or are planned to employ, integrated circuits produced in our current facility, RHIC-I. Relieving Sandia of the stress of starting up RHIC-II in a tight budget year allows more resources to be focused on the objectives of RHIC-I. We will also be able to explore the feasibility of developing second [commercial] sources for parts produced with RHIC-I technologies.

Furthermore, for the next three years, we have no firm production commitments for DOE programs in the two-micron technologies planned initially for RHIC-II. Our recent success in developing hardened two-micron technology as a joint program with industry causes us to believe that we can meet our two-micron development needs during the next three years by working closely with industry partners for fabrication of our designs.

SEMATECH could provide further industry impetus to ensure that this partnership worked effectively. Our ability to carry out a strong two-micron development program during the next few years would not be adversely affected by SEMATECH use of RHIC-II.

### Neutral at Worst, Positive at Best

"What I said in that letter was, essentially, that at worst, SEMATECH's use of RHIC-II would have a neutral impact in terms of meeting current commitments," Bob says. "At best, the impact would be positive in that it could free up resources for RHIC-I."

So we *could* do without RHIC-II temporarily. But *should* we? After all, Sandia worked hard to justify a state-of-the-art semiconductor-fabrication facility (see "RHIC-II: Beyond Just Clean" story). Hundreds of Sandians have been involved in its design and construction. Do we now want to delay using it?

"Since we first justified the funding for RHIC-II back in 1982, we've seen some new, and significant, confluences in the interests of Sandia, the government, and industry," says Bob. "Allowing SEMATECH to use RHIC-II is probably the best way to move toward the technologies we need for the 90s."

(Continued on Page Seven)

## SEMATECH

Yes, we could go it alone, but it would take longer and we'd end up paying a higher price. We realize we're proposing a deviation from our original plan, but it's a short-term deviation — and we're confident of better long-term results."

"When we justified RHIC-II funding in 1982, the issue of U.S. industrial competitiveness in the semiconductor field was not as critical as it is today," states President Irwin Welber. "We justified RHIC-II on the basis that it would provide our weapon systems of the future with the most advanced radiation-hardened devices.

"The basic question is, 'How can we and DOE serve national security in the most effective way today?' Irwin continues. "I believe it is by using RHIC-II to help SEMATECH get started as quickly as possible — because without a strong and competitive semiconductor industry, this country's national security is at risk."

"SEMATECH's acceptance of our proposal would mean that Sandia would be supporting a new mission of national security importance," adds Bob. "Acceptance of the proposal would lead some of us into different jobs; it could even lead to additional jobs. That's an important consideration in a time when our budget is being trimmed.

"We believe that, in many ways, the pace of Sandia's development of semiconductor technology would be accelerated, not slowed," Bob continues. "In addition, a Sandia-SEMATECH relationship would serve to couple Sandia's microelectronics program very closely with industry programs, a goal we've had for many years."

"One of the ironies of the present situation in the U.S. semiconductor industry is that, while it has fallen behind in manufacturing technology in the commercial sector, it has become more eager to participate in the defense sector," notes Larry. "And, by and large, the industry has become more capable

## RHIC-II: Beyond Just Clean

Both labs, RHIC-I (radiation-hardened integrated circuits) and RHIC-II, are part of Sandia's CRM (Center for Radiation-hardened Microelectronics). (For an understanding of the CRM's history and capabilities, see LAB NEWS, March 27, 1987.)

Because building a semiconductor demands the highest possible levels of cleanliness (see below), both labs feature clean rooms, third- or fourth-generation versions of the laminar-flow clean room invented by Willis Whitfield (ret.) in 1961. But RHIC-II has a world-class clean room, one that will serve as a test bed for many advanced clean-room features — new techniques to control vibration, temperature, humidity, and particulates. And the advanced features are built into the design, not added on to an existing structure.

RHIC-II has 22 individual clean-room bays (12,500 sq. ft. of the building's total working area of 173,800 sq. ft.). Each has independent laminar-air systems capable of reducing the number of airborne particles that are 0.12 or more microns in diameter to less than one per cubic foot of air. In other words, they're Class One clean rooms. "RHIC-II represents the state of the art in clean-

room design," says Bob Gregory (2100).

Achieving that kind of ultraclean is not easy. It means as many as 700 air changes an hour — out of the special ceiling and into the special floor — through filters with particulate-removal efficiencies of 99.9999 percent.

They're enveloped in a kind of cocoon, a Class 1000 clean room built around the 22 bays.

Why the expansive, and expensive, effort to ensure an ultraclean environment? Because integrated circuits (IC) today are printed on silicon wafers no bigger than a fingernail and carry circuit "wires" so fine that it takes 50 of them to match the width of a human hair. A speck of dust as small as a human cell could short out an IC.

And because people and equipment are dirty. Especially people — a human being at rest emits about a million particles per minute. "So we've made an extraordinary effort to keep people from contaminating the products in RHIC-II," says Bob. "We'll keep them completely enclosed — a building uniform and a clean-room uniform on top of that. And each uniform will be cleaned in a clean-room laundry after each use."

in the specialized technologies, such as radiation hardening, demanded in defense systems. Thus, we're confident that we will, with the help of SEMATECH, be able to achieve the close partnership with industry needed to meet our short-term development needs and position us well for the future."

### Nevertheless, Disappointment and Frustration

You've ordered a new car. It's your dream car, loaded with everything you've ever wanted a car to have. Expensive but worth it. You've waited for it for months.

If finally arrives, and it's beautiful — and the

dealer says, "Sorry, I'm going to use it for a demonstrator for three years."

Yes, there are many people eager to move into RHIC-II whose plans are now on hold, pending SEMATECH's decision as to whether to accept the Sandia-DOE offer.

"I understand and share their frustration and disappointment," says Larry. "All of us involved in the microelectronics program have very mixed feelings about this whole thing.

"But we can't let our emotions overrule our good sense," Larry concludes, "I believe that the offer we're making to SEMATECH is in the long-term best interests of our country, Sandia, and Sandians." ●BH

### New Colloquia Series

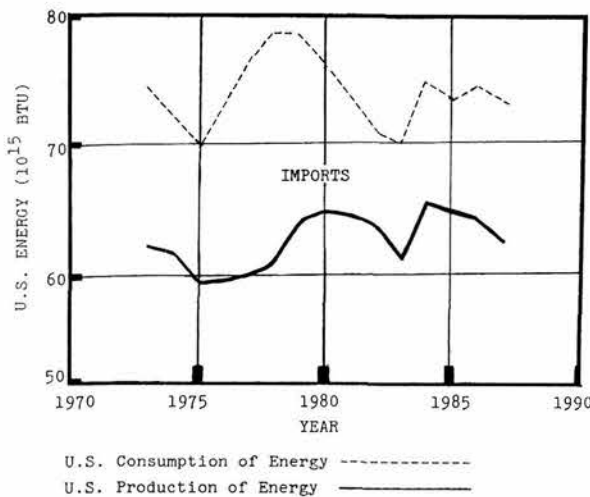
## "Contemporary Issues in Energy"

Sandia launches a new colloquia series, "Contemporary Issues in Energy," when H. M. (Hubb) Hubbard, Director of SERI (Solar Energy Research Institute), speaks at the Technology Transfer Center (Bldg. 825) on Dec. 16 from noon to 1 p.m.

"The U.S. needs energy for well-being, security, and economic expansion, but our production of energy is decreasing," says Dick Traeger (6240), chairman of the energy colloquia committee. "Sandia plays an important part in DOE's mission of assuring that the U.S. has adequate energy supplies at reasonable cost. We developed this colloquia, with the encouragement of Irwin Welber [1] and Dan Hartley [6000], to help understand our role in that mission and to provide a perspective for future R&D."

"We want to develop an awareness of energy issues among Sandians; establish contacts with academic, industrial, and government groups involved in energy R&D; advertise Sandia's capabilities and initiatives in nuclear power, geosciences, combustion research, and uses of coal; and identify areas for future joint R&D with industry and the academic community," Dick continues.

Other speakers: John Deutch, Provost of MIT (former Undersecretary of the Office of Energy Research for the DOE), "National Labs," Jan. 2; Wallace Broecker of Lamont-Doherty Geological Observatory (Columbia University), "CO<sub>2</sub> and Climate," Jan. 12; and Thomas Bahr of New Mexico Energy Minerals and Natural Resources, "New Mexico Resources," April 20. Others contacted but not yet scheduled are Louisiana Senator Bennett Johnston, Chairman of the Senate Energy and Water Development Appropriations Committee; and Dallas Peck, Director of the U.S. Geological Survey.



THE GAP BETWEEN CONSUMPTION AND production of energy in the U.S. remains constant. "We continue to depend on imports," says Dick Traeger (6240). "From a national security standpoint, that's something to be concerned about."

Suggestions for improving the series and obtaining top speakers are welcomed. Contact any of the committee members: Dick Traeger (6240), chairman, 4-2155; Chris Tolendino (6240), coordinator, 6-0142; Joe Abbin (2541), 4-8590; Rip Anderson (6334), 4-6553; Dave Carlson (6513), 4-8497; Dan Dougherty (1846), 4-1933; Mike Dyer (8362), 532-2678; Terry Gerlach (6233), 4-5929; Wayne Goodman (1134), 4-5435; and Dave Gartling (1511), 4-9150.



## FY87 Payroll Reaches Nearly \$342 Million

Sandia payroll for fiscal year 1987, which ended Sept. 30, amounted to about \$296 million at SNLA and \$46 million at SNLL for a total of \$342 million. The total exceeds the FY86 payroll of nearly \$318 million, which included \$275 million for Albuquerque and almost \$43 million for Livermore. Salaries of 135 employees at NTS, TTR, and other locations are included in the Albuquerque figure.

At the end of FY87 Sandia had 8397 employees on roll, including 1080 at Livermore. The total is 120 more than the 8277 reported at the end of FY86.

Assets of DOE's installations operated by Sandia totaled \$923 million at the end of FY87, compared to \$836 million in FY86. This figure represents undepreciated value of buildings and facilities at SNLA, SNLL, and TTR.

Purchases by Sandia in New Mexico amounted to almost \$244 million for FY87. About 97 percent of the amount, or \$236 million, went to firms in the Albuquerque area. Purchases in the state in FY86 amounted to \$227 million.

The Labs paid \$34.5 million in New Mexico gross receipts tax on its purchases in FY87 and nearly \$736,000 in New Mexico unemployment insurance taxes. More than \$10 million was withheld from employee paychecks for New Mexico income taxes.

## Fun & Games

**Bowling** — SANDOE Bowling Association Bowlers-of-the-Month for September are: Men's Scratch, Wayne Yoshimoto (7412), 684; Women's Scratch, Frances Candelaria, 625; Men's Handicap, Dick Radtke, 646; and Women's Handicap, Thelma Harrell (9110), 643).

\* \* \*

**More Bowling** — Winners of the 4-Game No Tap Tournament at Holiday Bowl on Oct. 17 & 18 were John Sanchez and Cheryl Adams with a 1529 combined handicap series. Second went to James Vernon and Cheryl Wiltsie with a 1518 combined handicap series. All winners were guests of SANDOE Bowling Assn. members. The next tournament will be a "Best Ball" at Iceland Bowl on Nov. 14 & 15.

\* \* \*

**Golf**—The Sandia Golf Association intraleague playoff was held Oct. 24 at the UNM South Golf Course. The format for the championship event between the A, B, and C league was 3-man team total net score. The winning team members were Phil Fagan (123), Ned Underhill (3718), and DuWayne Branscombe (2117). Close behind were Reynold Tamashiro (7412), Dan Buller (1111), and Howard Cilke (9212) with 224; followed by Tom Cordova (3411), Floyd Salas (9131), and Charles Salazar (7485), with 235.

## Take Note

Dan Reda (6225) was appointed *ASME Journal of Fluids Engineering* Associate Editor for the period 1988 to 1990. He's responsible for coordinating technical reviews and making publication decisions on papers that address experimental techniques and measurements in fluid-mechanics research areas. He continues to serve as an active member of the ASME Fluid Mechanics Technical Committee.

\* \* \*

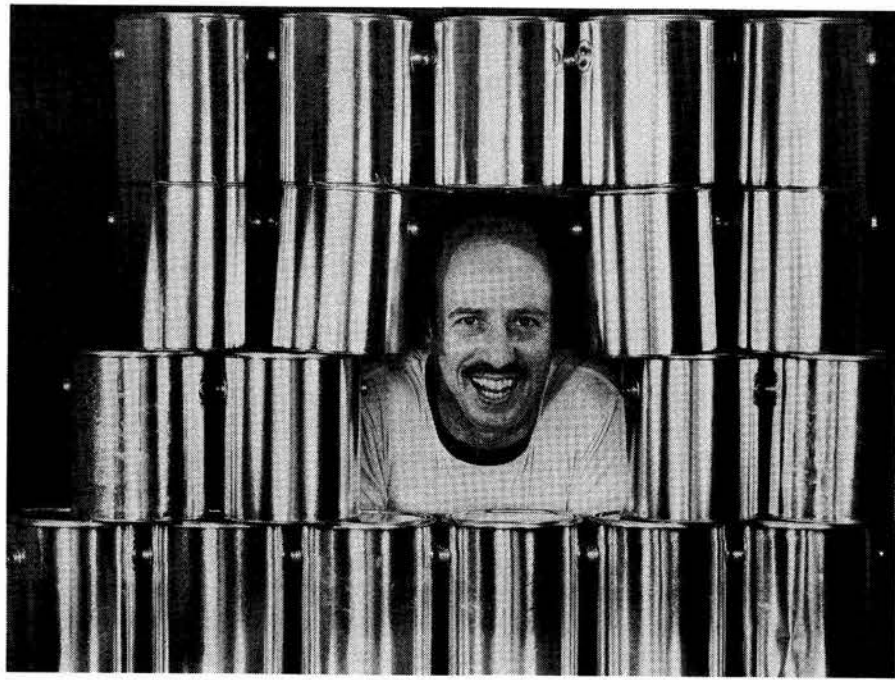
Ron Loehman (1842) and Graham Yelton (7473) will talk about superconductors and precious metals at the next TAA (Technicians Affiliate Association) meeting on Nov. 12 at 5 p.m. at the Coronado Club. The first election of officers will also be held. Door prizes and refreshments, too. For more information, contact Ralph Tissot (1822) on 4-5671.

TLC will host a triad of free noontime seminars presented by Judy Ewing (3330) and Chris Perry on "Stress Management" at the Technology Transfer Center (Bldg. 825). Topics and presentation dates are: "Stress Reduction Techniques," Nov. 13; "Massage Therapy and Stress Reduction," Nov. 16; and "Time Management," Nov. 20. All Sandians are invited to attend.

"Freedom from Smoking" is offered by the American Lung Association of New Mexico. The eight-week clinic is held Tuesdays beginning Nov. 10 from 7-9 p.m. Enrollment is limited, pre-registration is required, and cost is \$50. For more information, contact the Lung Association on 265-0732.

Mild hypertensives are again needed for an antihypertensive medication study being conducted by local physician Dr. Ronald Rosandich. To participate, applicants must be otherwise healthy and must not have asthma. They can be up to 70 years old. The study lasts 10 weeks, and participants who complete it will be paid \$300. For more details, call 268-2481.

Western Africa comes to Popejoy Hall with the rich fabric of one of Africa's oldest cultures. Forty dancers, singers, and musicians in the native costumes of Senegal will perform Nov. 10 at 8:15 p.m. Popejoy Hall is offering two-for-one discount tickets at the box office to all Sandians with a valid I.D. Tickets are two for \$20, \$15, or \$10. Call 277-3121 for more information.



STUART BARTH (3426) has given a little more than "a ruddy drop of manly blood" — he's working on his 19th gallon! And that's a lot of blood, as shown by the gallon-sized paint cans surrounding him. United Blood Services has presented Stuart with a special award. "They gave me a name plate and a desk set this time," says Stuart, "but when I reach the 20-gallon mark, they're really going to make a big deal of it."

## feed back

**Q.** According to a recent Weekly Bulletin, those who are in the Alcoholism and Drug Abuse program are now to charge their time to A-505, Disciplinary Time Off Without Pay. Why are we now disciplining employees with these diseases? Apparently the LAB NEWS story (June 19, 1987) about the program did not deal with the facts, or else Sandia is now changing its position about the program. It's no wonder people are afraid of losing their clearances and not trying to help themselves. How many people can afford to take two months off the job without pay?

**A.** Sandia continues to define alcoholism and drug abuse as treatable diseases and offers a program in Medical to provide appropriate treatment. Sandia attempts to assure that employees with these illnesses are given the same careful consideration and offer of services that they receive for other illnesses — provided that the person affected *accepts* prescribed treatment. Sick leave and insurance benefits are provided during the treatment phase of rehabilitation. It is company policy not to attach social stigma to drug or alcohol addiction, but rather to accept these afflictions as illnesses.

To assist the employee in regaining independence from the addictive substances, the initial emphasis of the program is on total abstinence and active rehabilitation.

Employees who recognize that they have an alcohol or drug problem may voluntarily enter the program at any time. Sandia does not ask other employees to enter the program until their job performance is impaired by the problem. If, after a reasonable time, the employee refuses Sandia's help, and if performance continues to be unsatisfactory, the employee is given the choice of accepting the assistance available or the consequences of poor job performance.

During the treatment and rehabilitation period, the employee is eligible for sickness absence and Medical Care benefits. Employees usually charge sickness absence codes A-250 or A-251 for these absences.

If, however, the patient relapses into continued alcohol or drug use after the treatment and rehabilitation effort, the next step is a 30-day disciplinary suspension. A second relapse and subsequent poor performance lead to a 90-day disciplinary suspension. These suspensions are charged to A-505 and are without pay. Both of these suspension periods are designed to allow patients to recognize what their jobs mean to them.

These suspensions used to be charged to A-506, a separate A-order used for such relapses. Using A-505 gives the patient more anonymity and eliminates one A-order number.

Sandia hopes that the suspensions will provide a meaningful incentive that will force addicted employees to abstain from alcohol or drug use. Only when rehabilitation is unsuccessful is a graduated suspension system invoked; it results in termination if positive results are not attained.

Paul Mossman - 3300  
Paul Stanford - 100

## Supervisory Appointments



NORMAN BAKER (5122) and DOROTHY RARICK (2626)

NORMAN BAKER (DMTS) to supervisor of Weapon Program Integration Division 5122, effective Sept. 1.

Norman joined the Labs in June 1959 as a member of the Quality Assurance Weapons Projects Division. He worked with quality assurance task groups for several bomb and warhead programs. In March 1972, he moved to the weapons design organization, where he participated in concept and feasibility studies and fielding of new weapon systems. Norman was the lead electrical engineer in the NDSB Development Division when he was promoted.

He served with the U.S. Army for two years, and worked at Bendix in Kansas City. He left Bendix to earn a BS in EE from the University of Missouri before coming to Sandia.

Norman's sparetime activities include church work, cabin-building, and solar and electronic home projects.

He and his wife Nancy live in the NE Heights. They have three grown children.

\* \* \*

DOROTHY RARICK to supervisor of Personnel and Property Systems Design Division 2626, effective Sept. 1.

Dorothy joined Sandia in January 1982 as a member of Div. 2626 where she worked as a systems analyst until her promotion. Her work included development of the Personnel and Education System and the Job Placement System. She was project leader of the Personnel Reporting System.

Before joining the Labs, Dorothy was a systems analyst with Exxon in Houston. She has a BA in mathematics from Lamar University in Beaumont, Tex., and an MBA from Texas A&M.

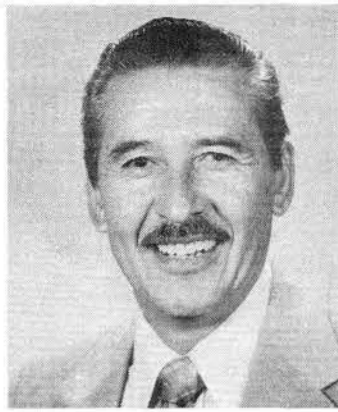
In her spare time, Dorothy enjoys skiing and fishing with her family. She and her husband Charles have one daughter and live in the NE Heights.



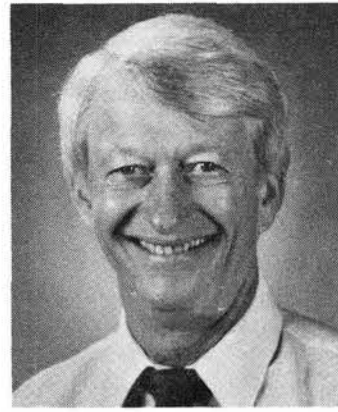
# MILEPOSTS

## LAB NEWS

NOVEMBER 1987



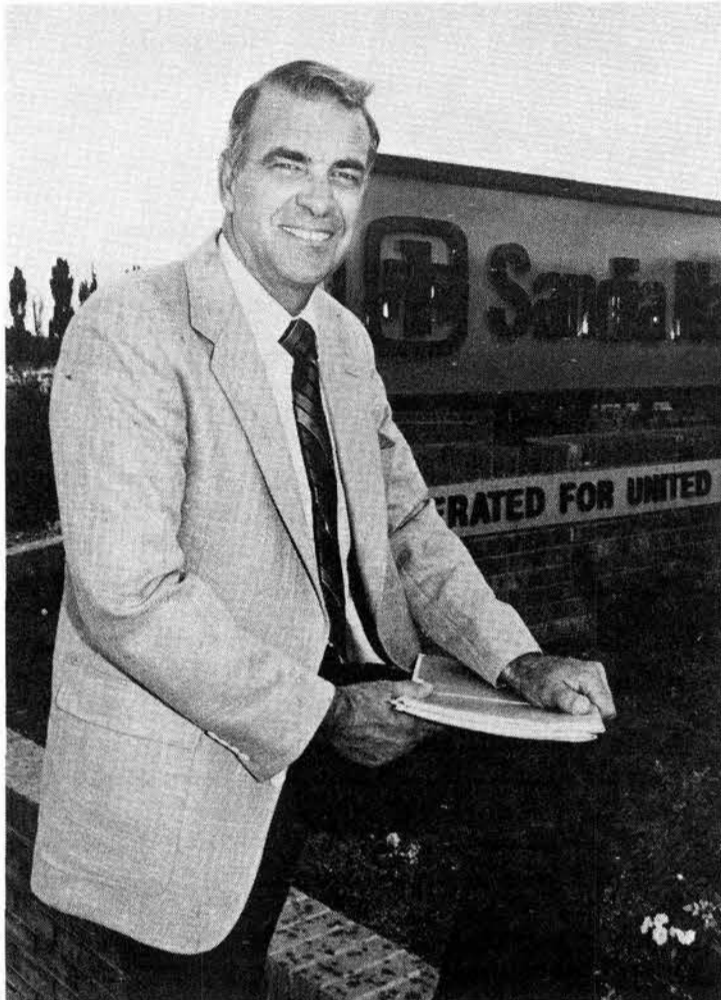
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Rex Steele (8446) 25



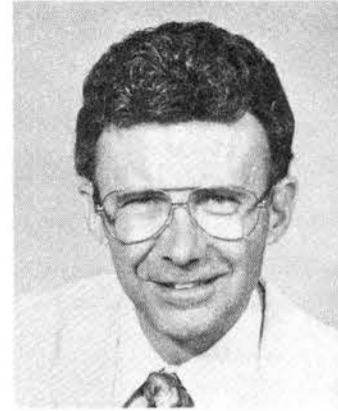
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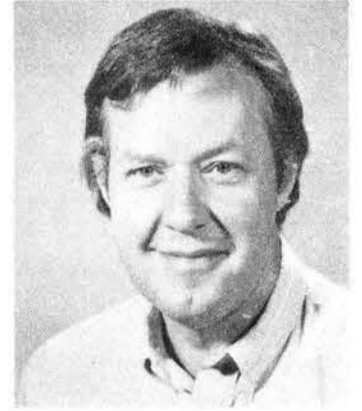
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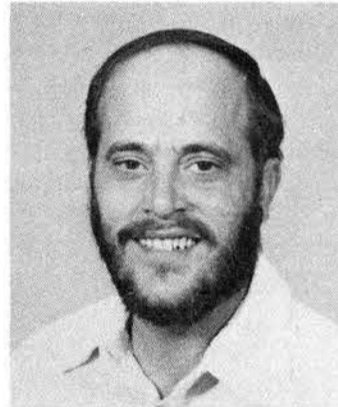
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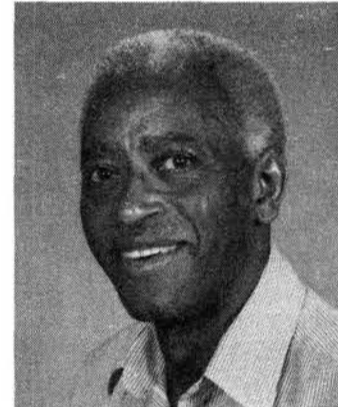
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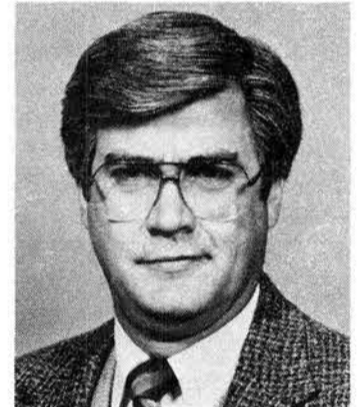
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Michael Vahle (2633) 10



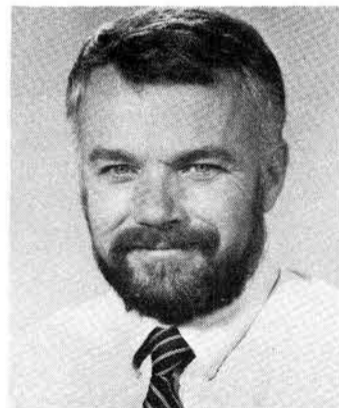
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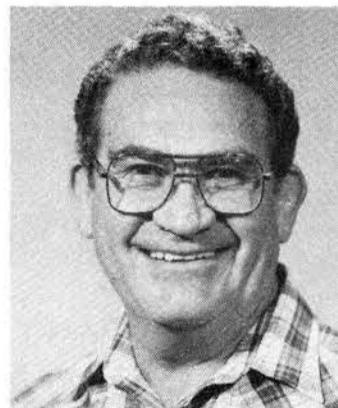
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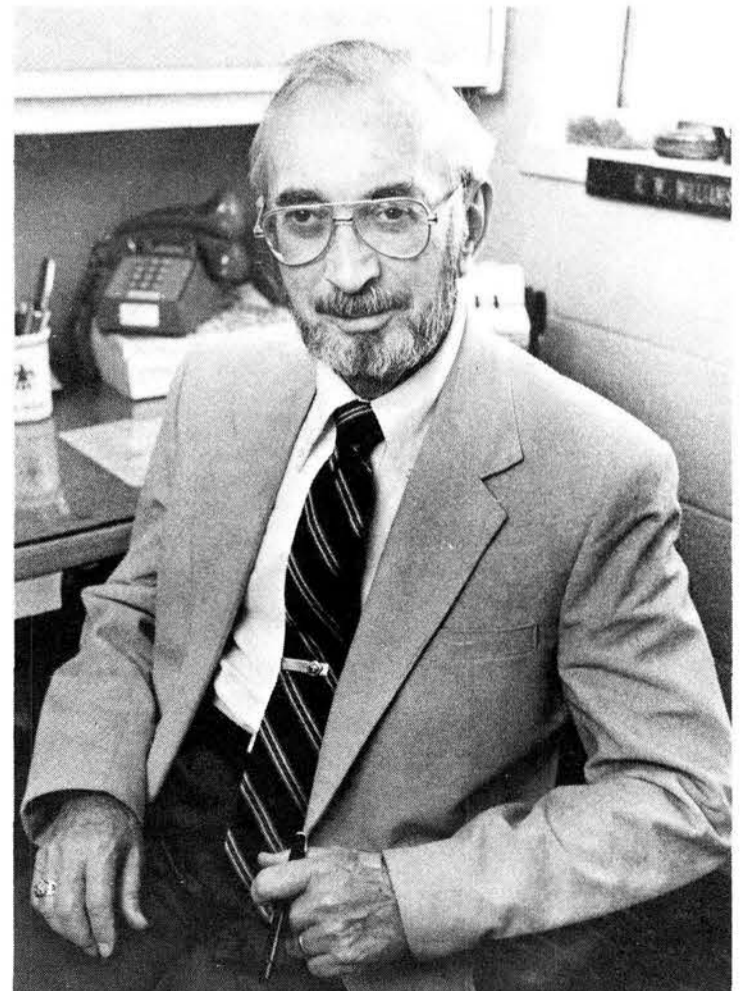
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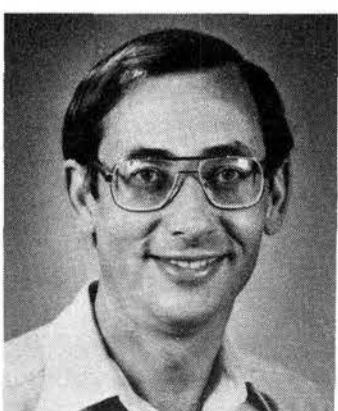
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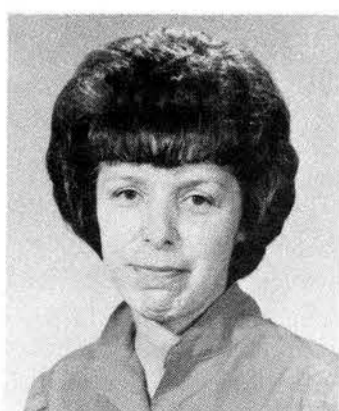
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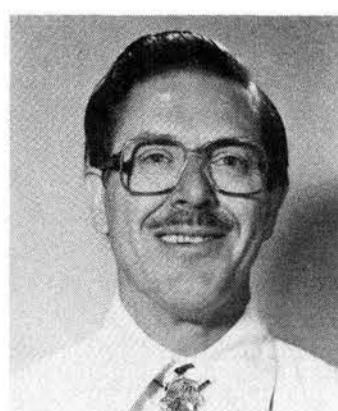
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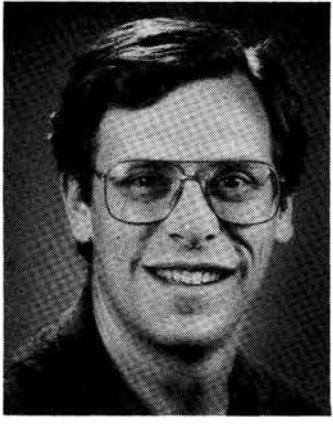
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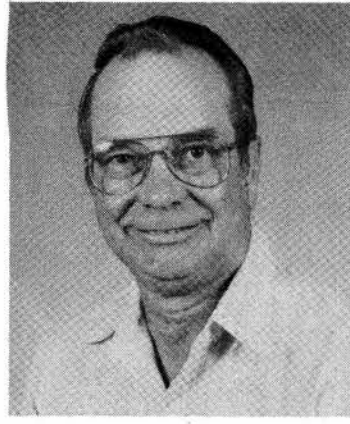
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Jay Spingarn (8312) 10



Laurie Farren (8262) 10



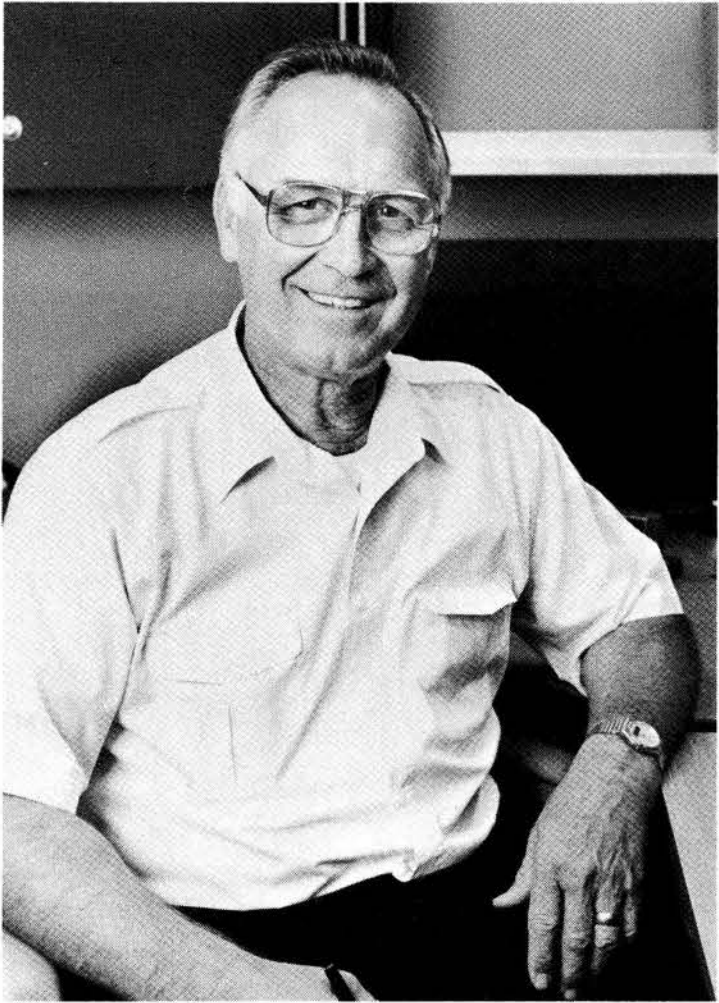
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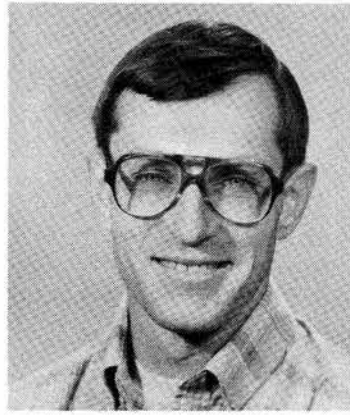
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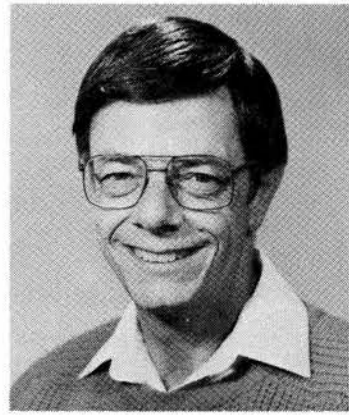
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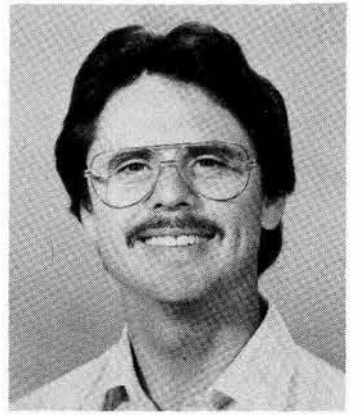
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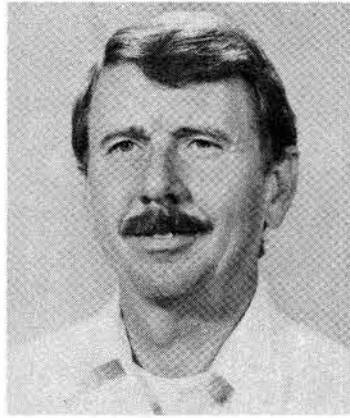
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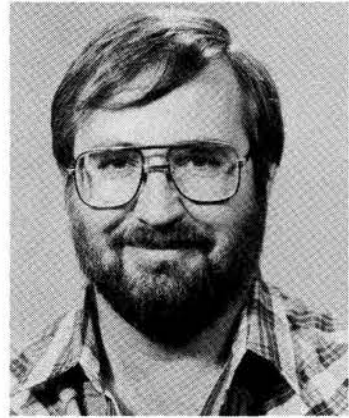
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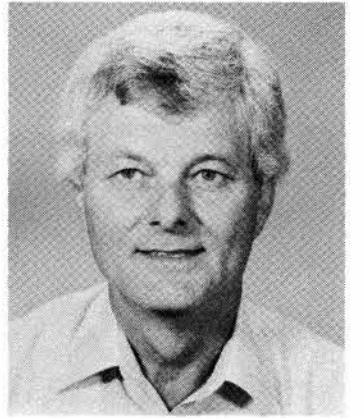
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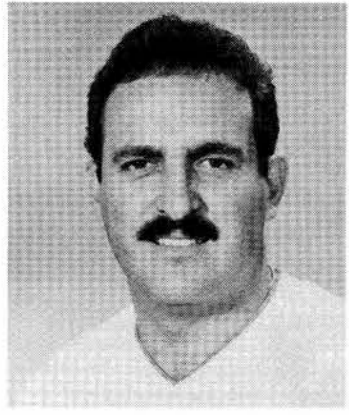
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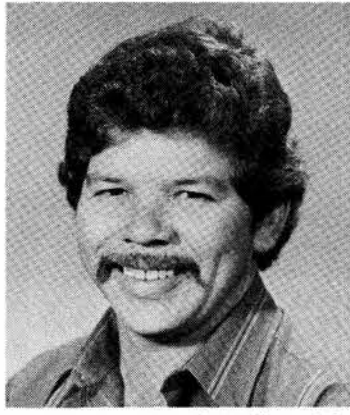
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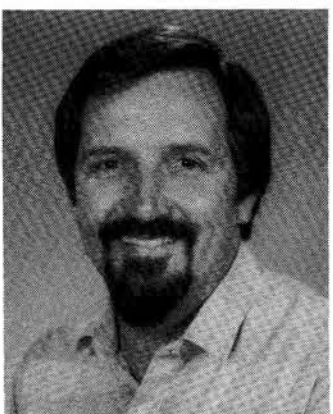
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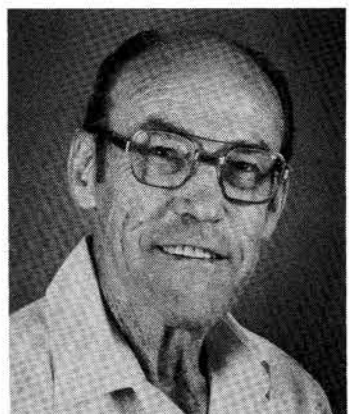
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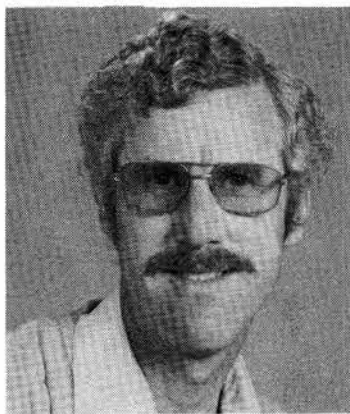
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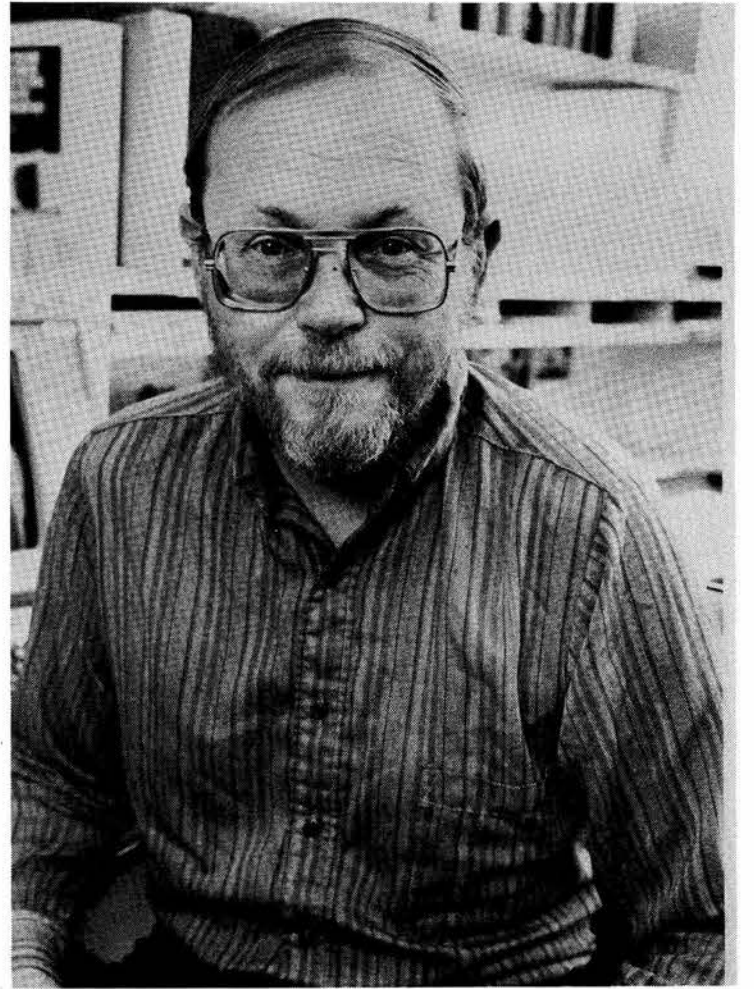
John Smugeresky (8312) 15



James Gruver (8271) 30



Carl Melius (DMTS, 8357) 15



Pete Stirbis (1522) 30



## Do the Champagne Shimmy At Brunch of Fun This Sunday

THE BEST BRUNCH BARGAIN in town is what's in store when you head for the Club on Sunday (Nov. 8) any time between 10 a.m. and 2 p.m. A complimentary glass of champagne or wine accompanies the fantastic family fare: green chile stew, baron of beef, turkey, fried chicken, scrambled eggs, salsa, bacon, pancakes, home-fried potatoes, green beans almondine, tossed salad, fresh fruit, peach and cherry cobbler, pudding, jello, juices and other beverages — coffee, tea, and milk. If you haven't reserved your space yet, better do so right now (265-6791). Don't forget the membership card that day; it gets you a \$1/person discount (\$2/family limit).

DUST OFF THAT WESTERN HAT, because wearing it tonight at the sagebrush-shuffle shenanigans gets you a free drink. Also free are country-western dance lessons between 7:30 and 8:30 p.m., followed by toe-tappin' country tunes (until 12:30) by those Poor Boys from down south (Isleta, to be exact). Chuck-wagon chow on the two-for-one special features New York steak or scallops; again, members get a buck off the meal price.

DOUBLE YOUR PLEASURE tomorrow evening (Nov. 7) at Family/Variety Night when *two* movies light up the big screen (not at the same time!). Doubly featured, starting at 6 p.m., are a couple of Disney movies — "Apple Dumpling Gang" and "Mickey's Christmas Carol." Fill up first at a low-cost buffet (served from 5 to 6:30) offering all kinds of good stuff: hot dogs, pizza, burgers, etc. Plan to get there early, so you can watch some side-splitting cartoons between 5 and 6. As always, the movies are free.

THOSE HAPPY SHUFFLERS, better known as the T-Bird card sharks, will meet only once this month (Nov. 12), in deference to the turkey season that's right around the corner. Wheeling and dealing starts at 10:30 a.m. As usual, free refreshments and door prizes enhance the cards and conversation.

JIVIN' AT THE JUNCTION — *Tuxedo Junction*, that is — is what you'll be doing a week from tonight (Nov. 13) when Don Lesmen and his group provide those Big Band sounds for dancing from 8 to 11:30 p.m. Beforehand, dine on some elegant entrees: prime rib or halibut. Since the Lesmen crew always attracts an SRO crowd, it might not be a bad idea to make a very early reservation.

THINKING PRECIPITATION — the white kind — is what members of the Coronado Ski Club are doing these days. This month's schussboomer meeting on Nov. 17 (7 p.m.) features Dr. Brian Altman, orthopedic surgeon, who'll discuss skiing injuries and (we hope!) how to avoid them. As usual, refreshments are available, and fantastic door prizes go to a lucky few.

ELECTED AND APPOINTED C-Club Board officers for FY88 are Ken Sorenson (6322), president; Mark Kiefer (1265), vice-president; Alice Maese (132), treasurer; Marlene Smith (7260), secretary; Al Chavez (3543), Sandia representative; and Leo Apodaca (DOE), DOE representative.

THOSE WAGON WHEELS keep on turning as the Thunderbird Roadrunners RV group hits the trail for Cochiti Lake Nov. 17-19. All T-Bird members and guests are welcome to join the caravan. More info from wagon masters Bill Minser (299-1364), Duane Laymon (822-1749), or Tom Brooks (344-5855).

TENDER T-BONES and succulent snow crab are your menu selections on Friday night, Nov. 20,



NEW AND HOLD-OVER members of the C-Club Board got together a couple of weeks ago to start making plans for the coming year. Seated (from left) are Al Chavez (3543, appointed Sandia rep), Alice Maese (132), Mark Kiefer (1265), Phyllis Padilla (3521), Mike O'Bryant (2858), and Marlene Smith (7260). Standing are Jack Mortley (7521), Leo Apodaca (appointed DOE rep), Dick Fairbanks (3521), Ken Sorenson (6322), Ed Neidel (ret.), and Steve Ross (3438). Not pictured is Anna Bachicha (DOE).

at the two-for-one special dinner. Stomp music's presented from 8 p.m. to midnight by (who else?) the popular good old boys from Isleta. Be sure to reserve your place in the chow line.

HOW DO YOU SPELL RELIEF from pocket-book strain? If you're thinking of becoming a C-Club member, it's spelled N-o-o-v-e-m-b-e-r. Sign up any time during the month, and receive two months of free membership; that's a \$10 discount off the usual annual fee of \$60. As everybody knows, C-Club membership opens the door to a lot of outstanding opportunities: terrific tennis and swimming facilities; special dinners on Friday night (with live dance music afterward); special kids' events (Halloween and Christmas parties, Easter egg roll); Sunday brunches; and special-interest groups such as the ski club, Wolfpack, bowlers, and Thunderbird retirees. Add an excellent travel program and catering facilities, plus discounts on brunches and two-for-ones, and you have a real winner on your hands. It's painless to sign up; just call or stop by the Club office (265-6791).

ALL RIGHT, OK, YOU WIN — especially when you make a reservation for one of those tantalizing trips that's been put together by the C-Club travel committee. Here's what's coming up:

*Discover Disney Delights* during an eight-day trip (Dec. 26-Jan.2) to sunny Florida. What a way to spend the holidays! This one's jam-packed with things to do: three days at Disney World/Epcot Center, a day at Sea World, a visit to Cypress Gardens, a tour of Cape Canaveral, and a dinner show. The adult (double) price of \$847/person covers admissions for all of the above, RT air fare, ground transportation, five buffet breakfasts, and seven nights at the Ramada Resort Maingate (Orlando). Kids bunking in a room with parents pay less: \$663, ages 12-17; \$618, ages 3-11.

*Consider Cozumel* if you're looking for a dream vacation; this one really fits that description. Get away from it all (Jan. 22-29) at the luxurious Club Cozumel Caribe on the island of Cozumel, just off the Yucatan coast. The trip tab of \$835/person (double) covers a garden-view suite; all meals; unlimited beer, wine, and cocktails; nightly entertainment, first-run movies, parties, and fiestas; round-trip air fare, and more. A \$100 deposit holds your space for this exotic excursion; final payment due on Nov. 30 (cancellation insurance available).

While we're on the subject of getting away from it all, the travel committee would really like your ideas on places to go and things to see. Contact committee chairman Dick Fairbanks (3521) if you know of any super vacation spots that shouldn't be missed.



A ROYAL WELCOME (well, sort of) is what VP Dennis Roth (3000) got at the 3500 staff meeting last month. Decked out in Halloween costumes, "greeters" from each 3500 department welcomed Dennis (he joined the Labs Oct. 1) and filled him in on department activities. Here, Soila Brewer (3533) — modeling "worst-dressed-employment-candidate" attire — gets ready to tell Dennis what goes on in Personnel Dept. 3530. A penny for your thoughts, Dennis!